

WHAT IS CLAIMED IS:

1. An ink-jet recording unit comprising:

ink guides each of which is arranged in an ink channel to feed ink in a form of a dispersion of charged colorant particles in a solvent, has a tip protruded from an ink level in said ink channel, and guides the ink to the tip to agglomerate the colorant particles to eject the ink having the agglomerated colorant particles;

ejecting electrodes each of which is positioned between the ink level and the tip of each of said ink guides in a height direction of said ink guides and is provided in close proximity to each of said ink guides;

voltage application means which applies to said ejecting electrodes a high-voltage pulse which is identical in polarity with said charged colorant particles to thereby allow the ink containing the colorant particles agglomerated at the tip of each of the ink guides to be ejected;

shaking means which shakes the ink guided by said ink guides; and

operation control means which controls an operation of said shaking means.

2. The ink-jet recording unit according to claim 1, wherein said shaking means is provided so that an ink shaking direction conforms to an ink ejecting direction.
3. The ink-jet recording unit according to claim 1, wherein said shaking means is a self-vibrating body arranged in close proximity to said ink guides and transmits vibration to said ink guides to vibrate said ink guides thereby shaking the ink guided to said tip of each of said ink guides.
4. The ink-jet recording unit according to claim 3, wherein said self-vibrating body is arranged on a base side of the ink guides opposite to the tip of each of the ink guides.
5. The ink-jet recording unit according to claim 1, wherein at least a part of each of said ink guides comprises a self-vibrating body and the tip of each of said ink guides is arranged as said shaking means.
6. The ink-jet recording unit according to claim 1, wherein said shaking means is a vibrating body arranged in said ink channel in close proximity to said ink guides.

7. The ink-jet recording unit according to claim 1, wherein said operation control means applies to said ejecting electrode an ejecting voltage above a predetermined value required to eject the ink from the tip of each of said ink guides in an ejection period, and applies to said shaking means a shaking voltage below the predetermined value at which the ink is ejected in a non-ejection period except the ejection period so as to shake the colorant particles at the tip of each of said ink guides.

8. The ink-jet recording unit according to claim 1, wherein, while the ink having the agglomerated colorant particles is ejected from the tip of each of said ink guides at predetermined intervals, said operation control means applies an ejecting voltage to said ejecting electrode as well as shakes the ink having the agglomerated colorant particles at the tip of each of said ink guides so as to eject the ink having the agglomerated colorant particles from the tip of each of said ink guide.

9. The ink-jet recording unit according to claim 1, wherein, while the ink having the agglomerated colorant

particles is ejected from the tip of each of said ink guides at predetermined intervals, said operation control means applies to said ejecting electrode an ejecting voltage above a predetermined value required to eject the ink from the tip of each of said ink guides in an ejection period, as well as keeps continuously applying to said shaking means a shaking voltage below the predetermined value at which the ink is ejected in the ejection period and a non-ejection period except the ejection period, thus continuously shaking the colorant particles at the tip of each of said ink guides.

10. The ink-jet recording unit according to claim 1, wherein said operation control means comprises a radio frequency power supply which applies a radio frequency power to said shaking means and timing signal generation means which generates a timing signal to operate said radio frequency power supply.

11. The ink-jet recording unit according to claim 10, wherein said radio frequency power supply generates the radio frequency power having a frequency equal to an ejection frequency or integral multiple of the ejection

frequency and shakes the ink in synchronization with an ejecting operation.

12. An ink-jet recording method comprising the steps of:

applying a voltage identical in polarity with charged colorant particles agglomerated at a tip of each of ink guides arranged in an ink channel to feed ink in a form of a dispersion of the charged colorant particles in a solvent, to an ejecting electrode positioned between an ink level in the ink channel and the tip of each of the ink guides, thereby ejecting the ink from the tip of each of said ink guides; and

shaking the colorant particles at the tip of each of said ink guides to agglomerate the colorant particles at the tip of each of said ink guides in preparation for a subsequent ejection of the ink.

13. An ink-jet recording method comprising the steps of:

applying a voltage identical in polarity with charged colorant particles agglomerated at a tip of each of ink guides arranged in an ink channel to feed ink in a form of a dispersion of the charged colorant particles in a solvent, to an ejecting electrode positioned between an ink

level in the ink channel and the tip of each of the ink guides;

shaking the colorant particles agglomerated at the tip of each of said ink guides; and

ejecting the ink from the tip of each of said ink guides so that the ink flied onto a recording medium is adhered to the recording medium for recording.

14. A recording head cleaning method for an ink-jet recording unit in which ink is guided to the tip of each of ink guides arranged in an ink channel to feed the ink in a form of a dispersion of charged colorant particles in a solvent to thereby agglomerate the colorant particles, a voltage identical in polarity with the colorant particles is applied to an ejecting electrode positioned between an ink level in the ink channel and the tip of each of the ink guides, and the ink is ejected from the tip of each of the ink guides by way of a repulsion exerted between the ejecting electrode and the colorant particles to let the ink fly towards a recording medium for recording onto the recording medium, said method comprising the steps of:

filling said ink channel with a cleaning solution;
and

shaking said cleaning solution to clean said ink guides.